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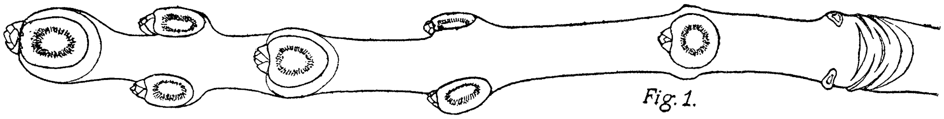


Fig. 1.

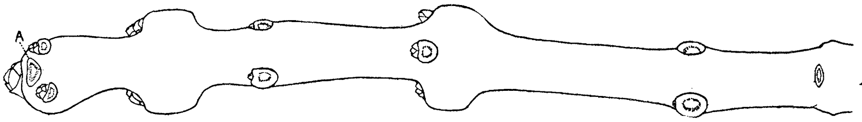
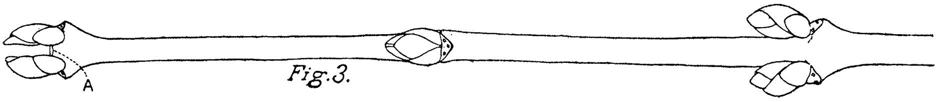


Fig. 2.



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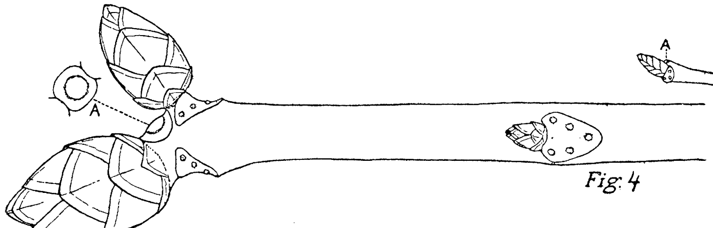


Fig. 4

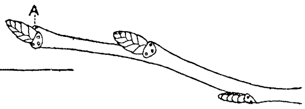
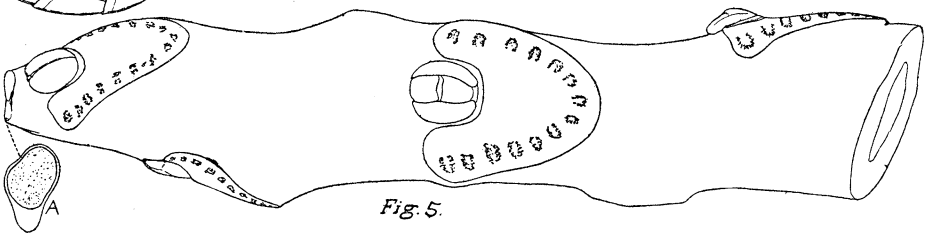


Fig 8



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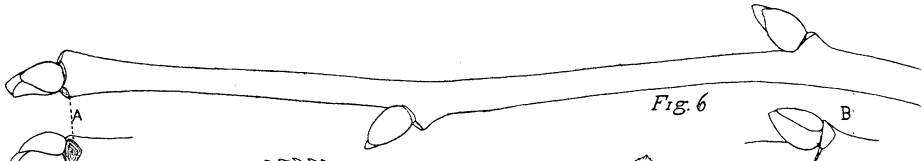

Fig. 6

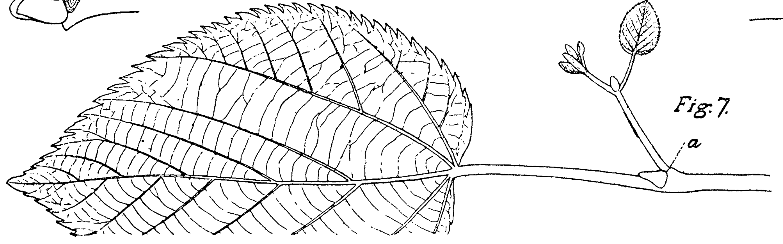

Fig. 7.

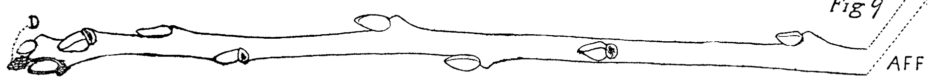

Fig 9

On the Casting Off of Twigs of certain Trees. A. F. Foerste.

On the Casting-Off of the Tips of Branches of Certain Trees.

By Aug. F. Foerste.

(Plate CXXXII.)

The growth of the branches of trees for each year ceases at widely different periods. Some trees continue growth until they are "killed back" by the early frosts of autumn. Others develop terminal scaly buds, often quite early in spring, and thus have the extent of their growth determined long before extraneous causes tend to check their development. The time at which terminal buds are formed varies widely in different species, but it is well known that before the end of May most trees have terminated the yearly growth of their branches in this way. A small percentage of our trees have, however, developed the curious habit of securing determinate growth, by casting off the tips of their branches at well formed joints. The scars left at these joints are usually smooth, and may readily be distinguished from leaf-scars by the fact that the fibro-vascular tissues do not form bundles, and appear as little protuberances in the scar, as is the case with most leaf-scars. Instead, the fibro-vascular tissues form a more or less circular figure, following the outline of the scar, as might be expected, since they represent the fibro-vascular tissues between the wood-layers and the bark proper. In *Catalpa speciosa*, Warder, this terminal scar may be seen on the lower sides of the branches (Fig. 2). The leaf-scars and the corresponding leaves are usually smaller here than on the upper side of the branch (Fig. 1) on the more mature twigs, although the leaves of each whorl are all similar during their early history. *Staphylea trifolia*, Linn. shows a terminal scar (Fig. 3), in some cases almost hidden between the two upper lateral buds. *Ailanthus glandulosus*, Desf. also has a terminal scar (Fig. 5). All the branches of the same tree do not cast off their tips, even in cases where part of the branches may almost invariably be expected to have done so. This is well shown by various species of *Æsculus* for instance, *Æsculus Hippocastanum*, Linn., where a part of the tips have been cast off, leaving exceedingly well-marked and evident terminal scars (Fig. 4), whereas almost all twigs of less vigorous growth, and some of those most normal in type, have become determinate in the usual way by means of terminal scaly buds. Certain species of trees, however, show a remarkable uniformity regarding the casting off of the tips of all their branches. Thus in case of *Tilia platyphyllos*, Scop., it was necessary to search for several hours during the last days of May, in order to secure the few specimens from which Fig. 7 was prepared, and all of these showed that another week would have witnessed the casting off also of these remaining tips (at *a* in the figure). Our American linden, *Tilia Americana*, Linn., also shows terminal scars (Fig. 6). It must not be supposed however, that all the tips of branches thus cast off are in as advanced a stage of development as those figured in the case of the European linden. Thus in the case of a European species of elm, the cast-off tips were small, none of the internodes of these tips being more than a few millimeters in length. A terminal scar is also shown by *Ulmus Americana*, Linn. (Fig. 8).

Of course the time at which the casting off of the tips takes place varies widely in different species. Thus during the last week of May it was found impossible to find tips of branches in the case of *Æsculus Hippocastanum* which had not been cast off, where such an operation was at all probable. All remaining branches had terminal scaly buds already formed. *Tilia platyphyllos* had also already cast off its tips, but three or four were still found in situ, although the plane of separation or joint had already been formed. *Ulmus campestris*, Linn., on the other hand, had lost only a third of its tips, although the plane of separation was becoming evident in the remainder. *Catalpa speciosa* had not yet reached a sufficiently advanced growth of its branches to give any indication of the future separation of its tips.

It may be of interest in this connection to mention that quite a number of trees and shrubs do not cast off their tips, nor form terminal scaly buds, nor are they "killed back" by frosts, but the tips of the branches simply wither and remain attached to the stem. *Diospyros Virginiana*, Linn., has been figured as a case of such a plant (Fig. 9). In certain shrubs this withering takes place in spring.

The casting off of the tips of branches may be looked upon as simply another solution of the problem how to secure determinate growth of branches, and thus obviate the useless expenditure of energy displayed by trees whose branches are always killed back by winter frosts. All the time which elapses between the formation of terminal scaly buds, or the casting off of the tips of branches, and the first frosts of autumn, may be looked upon as a period of preparation for the few weeks of active growth of the next season.

The Hepaticæ of Labrador.

By LUCIEN M. UNDERWOOD.

During the past three years Rev. Arthur E. Waghorne, of Newfoundland, has been sending large numbers of packets of Newfoundland Hepaticæ for examination, and has made a large number of additions to the only published list* from that province. The examination of this series had been interrupted, and a full report of the Newfoundland species cannot yet be given ; this will follow later.

During August of last year (1891) Mr. Waghorne took a short trip to the coast of Labrador, and as one of the results has sent over a hundred packets of liverworts for determination. With the exception of a few species from this coast sent me by Mr. O. D. Allen in 1887, these are the only ones yet reported from that region. While the list contains mostly species that would be expected from this locality, one or two species are of interest as having no definite location to which they could be assigned. This is particularly true of *Harpanthus Flotovianus*, which was described in the revised Manual as "certainly extra-limital" without my knowledge or approval. I have reason to believe it will be found in our Northern States, particularly in mountain regions.

I append the list as follows :

JUNGERMANIACEÆ.

1. *Blepharostoma trichophyllum* (L.), Dumort.
2. *Cephalozia bicuspidata* (L.), Dumort.
3. *Cephalozia divaricata* (Sm.), Dumort.
4. *Cephalozia fluitans* (Nees), Spruce.

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* Flora Miquelonensis, 1888.